

## EAST Search History

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L2	777668	vehicle	US-PGPUB; USPAT; EPO	OR	OFF	2007/06/21 09:20
L3	384	vehicle and battery with tray	US-PGPUB; USPAT; EPO	OR	OFF	2007/06/21 09:20
L14	840	inverter same cooling and vehicle	US-PGPUB; USPAT; EPO	OR	OFF	2007/06/21 09:52
L15	388	14 and liquid	US-PGPUB; USPAT; EPO	OR	OFF	2007/06/21 09:53
L16	12	("5966291"   "6166937"   "6414867"   "6529394").PN. OR ("6621701"). URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2007/06/21 10:18
S1	1	("20040251858").PN.	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2007/02/01 11:45

## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] Especially this invention relates to Battery Unit used as a power source of the hybrid car which assisted an internal combustion engine's (henceforth an "engine") output with the output of a motor generator about Battery Unit.

[0002]

[Description of the Prior Art] A high-pressure dc-battery (for example, 144 volts) is carried in a hybrid car as a power source of a motor generator besides a low-pressure (for example, 12 volts) dc-battery. The output of this high-pressure dc-battery relays a contactor and a fuse, and is further connected to the motor generator through the power drive unit (PDU).

[0003]

[Problem(s) to be Solved by the Invention] By the conventional hybrid car, since components which have the protection feature of a high-pressure dc-battery, such as said contactor, fuse, etc., were distributed and arranged at every place of a car, they had the following troubles. First, when a comparatively high-pressure cable is taken about on the components distributed by every place, the noise emitted from this cable may affect the electric control system of a car. Moreover, when components are distributing to every place, there is also a trouble that the maintenance of a dc-battery becomes complicated. Although collecting some of contactors and fuses and constituting a junction board was also considered, the point which improves the workability of a maintenance or makes the occupancy tooth space between components small was not still enough.

[0004] This invention solves an above-mentioned technical problem, and aims at offering Battery Unit which can collect the components for the protection feature of the high-pressure dc-battery carried in a hybrid car, and can raise maintenance nature and safety further.

[0005]

[Means for Solving the Problem] This invention for attaining the above-mentioned purpose has the description in the point of having provided the protection-feature section of the plate combined with the hybrid car which has the prime-mover section which combined the motor generator with the internal combustion engine by the support frame which supports a dc-battery and said dc-battery in Battery Unit carried as said object for motor generators, and said support frame, and said dc-battery formed on said plate, and the I/O connect-function section of this dc-battery.

[0006] According to the above-mentioned description, on the plate directly linked with the support frame of a dc-battery, said dc-battery protection-feature section concentration-izes in one, and is attached.

[0007]

[Embodiment of the Invention] Hereafter, this invention is explained with reference to a drawing.

Drawing 1 is the important section top view of a suitable hybrid car to apply Battery Unit of this invention. In this drawing, the prime-mover section 1 prepared in the anterior part of the hybrid car V is equipped with the internal combustion engine (engine) 2 of a 3 cylinder, the motor generator 3 for being directly linked with this engine 2 and assisting that output, and transmission 4. The output of the prime-mover section 1 is transmitted to front wheels 6 and 7 through a shaft 5. In order that the 1st dc-battery 8 may supply power to an ignition, a lighting system, etc. of an engine 2, it is prepared, for example, a thing with a rating of 12 volts is used.

[0008] The power drive unit (PDU) 9 for driving a motor generator 3 and the 2nd dc-battery 11 used as a power source for motor generator 3 are formed in the posterior part of Car V. As the 2nd dc-battery 11, the nickel-MH dc-battery of 144-volt rating can be used, for example. Moreover, the regeneration current generated in the motor generator 3 is supplied and accumulated in said 2nd dc-battery 11. The down barter 10 changes the output voltage of the 2nd dc-battery 11 into the rated voltage of the 1st dc-battery 8.

[0009] The substrate (junction board) 17 which collected the protection-feature components of a dc-

battery 11 in one is attached in the flank of the 2nd dc-battery 11, and the 2nd dc-battery 11 and the junction board 17 are covered with the protective cover 18.

[0010] Said down barter 10 and 1st dc-battery 8 are connected by the single phase cable 12, and a motor generator 3 and PDU9 are connected by the three-phase-circuit (high pressure) cable 13. The shielding wire with which the periphery was covered with the conductor is used for the cable 13. Rear wheels 14 and 15 are formed in posterior part right and left of Car V.

[0011] At the time of actuation, the direct current supplied from the 2nd dc-battery 11 is changed into three-phase alternating current by the inverter equipment contained in PDU9, and is supplied to a motor generator 3 through a cable 13 by it. At the time of idle operation of an engine 2, a motor generator 3 generates a current according to a regeneration operation, and accumulates power in the 2nd dc-battery 11 while being combined with the crankshaft of an engine 2, driving it to this engine 2 and coincidence and assisting driving force.

[0012] Next, the layout of said PDU9 and 2nd dc-battery 11 prepared in the posterior part of Car V is explained. Drawing 2 is the perspective view showing the important section of the posterior part of Car V, and the protective cover 18 of said 2nd dc-battery 11 shows the condition of having removed. In this drawing, the cooling system 16 is formed between PDU9 arranged on the left-hand side of [ posterior part ] Car V, and the down barter 10. The cooling system 16 contains the heat sink (not shown) prepared in PDU9 and the down barter 10 according to the individual, respectively, and air is introduced into this heat sink from the exterior of Car V. The introductory path of air is formed by the air-suction-system duct 20 by which connected with the inhalation opening 19 in which the end carried out opening caudad from the floor of Car V, and the other end was connected to one opening of a cooling system 16. The blower fan (a sirocco fan is desirable) 21 is connected to opening of another side of a cooling system 16. Moreover, the discharge path of air consists of a discharge duct 22 by which the end was connected to the blower fan 21, and the other end of this discharge duct 22 is connected to the exhaust port 23 which carries out opening out of a vehicle in the location distant from said inhalation opening 19 of Car V.

[0013] In this configuration, if a blower fan 21 drives, air will be incorporated by the cooling system 16 from the inhalation opening 19 via the inhalation duct 20, and PDU9 and a down converter 10 will be cooled. The air which took heat from the PDU9 grade and temperature went up passes along a blower fan 21, and is emitted outside exhaust port 23 empty vehicle via the discharge duct 22.

[0014] The 2nd dc-battery 11 which adjoined the down barter 10 and has been arranged also has the cooling system of air cooling. Refer to the cooling system of the 2nd dc-battery 11 also for drawing 3 collectively. Drawing 3 is the top view of the 2nd dc-battery 11. In drawing 2 and drawing 3, air is introduced from the inhalation opening 25 which the air-suction-system duct 24 was formed in the anterior part of the 2nd dc-battery 11, and was prepared in the end of this air-suction-system duct 24. An opening location is set up so that the inhalation opening 25 can adopt air from the interior of a room of Car V. On the other hand, the discharge duct 26 is formed in the posterior part of the 2nd dc-battery 11, and the blower fan 27 is formed in the edge of the discharge duct 26.

[0015] The 2nd dc-battery 11, the dc-battery ECU 28 which performs control of the contactor (after-mentioned) which opens and closes the circuit between PDU9 etc., and the motor ECU 29 for control of a motor generator 3 are formed in the upper part of the 2nd dc-battery 11. Moreover, the junction board 17 is attached in the left lateral of the 2nd dc-battery 11 toward the front.

[0016] In this configuration, if a blower fan 27 drives, air will be incorporated in the 2nd dc-battery 11 from the inhalation opening 25 via the inhalation duct 24, and the 2nd dc-battery 11 will be cooled. The air which took heat from the 2nd dc-battery 11, and temperature went up is emitted outside a vehicle through the discharge duct 26 and a blower fan 27.

[0017] Then, said junction board 17 is explained in full detail. Drawing 4 is the circuit diagram of the substrate which realizes the protection feature of the junction board 17 11, i.e., the 2nd dc-battery. In this drawing, the dc-battery part divided into these [ which the 2nd dc-battery 11 becomes from the 1st dc-battery part (57.6 volts) 111 and the 2nd dc-battery part (86.4 volts) 112 ] two is connected to the serial through the main switch 171 and the Maine fuse 172 on the junction board 17. The junction board 17 and each of the 1st dc-battery part 111 of the 2nd dc-battery 11 and the 2nd dc-battery part 112 are

connected through a terminal T1 - T four. On the other hand, the junction board 17, PDU9, and the down barter 10 are connected through terminals T5-T8.

[0018] The contactor 173 is formed between the terminals T5 of the plus terminals T1 and PDU of the 2nd dc-battery 11. A contactor 173 achieves the protection feature from an overcurrent while opening and closing a high-tension circuit. This contactor 173 consists of Maine contactor 173A and precharge contactor 173B which were mutually connected to juxtaposition, and precharge resistance 173C.

Moreover, between a terminal T1 and a contactor 173, the dc-battery current sensor 174 which detects the current which flows from the 2nd dc-battery 11 is formed, and the PDU current sensor 175 which detects the current inputted into PDU9 is formed between the contactor 173 and the terminal T5.

Moreover, between the contactor 173 and the terminal T7, the down barter fuse 176 for the short circuit protection of the down barter 10 is formed.

[0019] Minus terminal T four and the terminals T6 and T8 of the 2nd dc-battery 11 are connected to the ground through the capacitor 177 for radio noise reduction, and the terminal T1 is similarly connected to the ground through the capacitor 178. Between a terminal T2 and terminal T3, said main switch 171 and the Maine fuse 172 are connected. A main switch 171 opens and closes the 2nd dc-battery 11, and is manually intercepted at the time of a maintenance.

[0020] When connecting the 2nd dc-battery 11, PDU9, and the down barter 10 by this circuitry, a main switch 171 is supplied. After a main switch 171 is supplied, precharge contactor 173B carries out ON actuation first, and a precharge circuit is closed by the command from a dc-battery ECU 28. The current which flows this precharge circuit is restricted by precharge resistance 173C. Then, Maine contactor 173A carries out ON actuation by the command from a dc-battery ECU 28, and the Maine circuit is closed. In this way, since the current is restricted in the precharge circuit, joining of Maine contactor 173A is prevented.

[0021] Next, the connection on the junction board 17 to the 2nd dc-battery 11 and concrete arrangement of the components on the JANSION board 17 are explained. Drawing 5 is the perspective view of Battery Unit containing the 2nd dc-battery 11 and the junction board 17, and drawing 6 is the side elevation of Battery Unit seen from the junction board 17 side. Drawing 5 is drawing by which the discharge duct 26 for said cooling was removed from the 2nd dc-battery 11, and internal dc-battery cell 11A is observed. The base plate 170 of the junction board 17 is attached in the side face of the support frame 30 of the shape of a rectangular parallelepiped of the 2nd dc-battery 11, a main switch 171 is allotted to the right upper part on this base plate 170, and the Maine fuse 172 is arranged on the lower right section (in drawing 5, it is hiding with covering 185). Between a main switch 171 and the Maine fuse 172, the neutral point terminal (the terminal T2, T3) and minus terminal (T four) of a dc-battery which are connected to these are located.

[0022] Maine contactor 173A, precharge contactor 173B, and precharge resistance 172C are allotted to the left lower quadrant of the junction board 17. The plus terminal (terminal T1) is located between Maine contactor 173A and precharge contactor 173B.

[0023] Moreover, the down barter fuse 176, the dc-battery current sensor 174, and the PDU current sensor 175 are allotted to the center section of the junction board 17. The output terminal (terminals T5-T8) is allotted above the PDU current sensor 175. The fan control relay and the sign 180 by which a sign 179 controls turning on and off of a blower fan 27 are fan control resistance for controlling the airflow of a blower fan 27. The down barter 10 is connected through a coupler 181, and a signal line is connected through a coupler 182. The plus side between PDU9 and the down barter 10 is connected with the bus bar 183 of aluminum.

[0024] Drawing 7 is drawing seen from the side elevation of the 2nd dc-battery 11 in which the condition of having removed the junction board 17 is shown, i.e., the left-hand side of Car V. In this drawing, the plus terminal T1 of the 2nd dc-battery 11, minus terminal T four and neutral point terminal T3, and T four are faced outside from the side plate 184 of the 2nd dc-battery 11, and as shown in drawing 6, they are connected to each component part on a base plate 170.

[0025]

[Effect of the Invention] According to invention of claim 1 - claim 4, a dc-battery can be adjoined, the

protection-feature section of a dc-battery can be arranged, and it can put together in one so that clearly from the above explanation. Therefore, unlike distributing said protection-feature section in a car, simplification of wiring between each part articles and shortening of an interconnection cable are attained, and reduction of the effect of a voltage drop or a noise is achieved as a result. Moreover, a maintenance also becomes easy by the ability collecting the protection-feature section in one.

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[Translation done.]